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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/832,822 | 04/12/2001 | Keiichi Sato | Q64076 | 1928 |

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| EXAMINER | |
|---|---|
| GOFF II, JOHN L | |
| **ART UNIT** | **PAPER NUMBER** |
| 1733 | |

DATE MAILED: 04/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| *Office Action Summary* | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/832,822 | SATO, KEIICHI | |
| | Examiner | Art Unit | |
| | John L. Goff | 1733 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *12 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,4 and 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4 and 7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/12/04 has been entered. The previous 35 USC 112 rejections have been overcome.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### *Claim Objections*

3. Claim 7 is objected to because of the following informalities: Claim 7 depends on canceled claim 5. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

4. Claims 1, 4, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKague et al. (U.S. Patent 5,954,898) in view of Hiyamizu et al. (JP 02030518 and its English translation), Kohli et al. (U.S. Patent 4,749,729), and DellaVecchia et al. (U.S. Patent 4,269,884).

McKague et al. are directed to a method of fabricating partially cured (i.e. semi-hardened) intermediate parts (preforms) from fiber-reinforced composites wherein a plurality of

the partially cured parts may be assembled and fully cured to form a composite part for use in for example the aerospace industry (Column 1, lines 18-21 and Column 3, lines 1-21). McKague et al. teach fiber-reinforced composite sheets comprising reinforcing fiber (e.g. graphite) impregnated with thermosetting resin (e.g. epoxy) (Column 3, lines 62-64 and Column 11, lines 15-18). McKague et al. teach a method for fabricating the partially cured intermediate parts from the fiber-reinforced composite sheets comprising: a) stacking a plurality of the sheets (Figures 2 and 4 and Column 5, lines 26-29), laminating the stack under heat and pressure to form a flat board-shaped laminate (Figures 2 and 4 and Column 5, lines 46-49, 52-53, and 62-64), and cooling the flat board-shaped laminate to room temperature (Column 6, lines 5-9); b) cutting the flat board-shaped laminate (Figures 2 and 4 and Column 6, lines 11-15); and c) heating the laminate to a partial cure, (Figures 2 and 4 and Column 6, lines 17-20 and 34-38) and reshaping the laminate using a cold press forming tool (Figures 2 and 4 and Column 6, lines 20-22). McKague et al. further teach using a plurality of the partially cured intermediate parts to form other parts of complex shape (e.g. a T-shaped intermediate product) (Figures 4 and 10 and Column 7, lines 54-61). McKague et al. are silent as to forming the flat board-shaped laminate (step a) through a continuous rather than batch process. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the flat board-shaped laminate (step a) taught by McKague et al. using a continuous process as suggested by Hiyamizu et al. to produce uniform quality laminates in an efficient (i.e. reduced time and handling involved) manner.

Regarding the laminating conditions, McKague et al. as modified by Hiyamizu et al. do not expressly recite the claimed laminating conditions, i.e. heat, pressure, time, etc., for (step a)

and (step c). However, neither McKague et al. nor Hiyamizu et al. are limited to any specific resin or any specific laminating conditions with it being noted the only resins suggested by McKague et al. are epoxy which is one of applicants preferred resins (See page 3, lines 24 and 25 of the specification). It would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine/optimize the laminating conditions for (step a) and (step c) in the method taught by McKague et al. as modified by Hiyamizu et al. as a function of the specific resin used (it being noted that both McKague et al. and applicant prefer the same resin which would require similar laminating conditions) as doing so would require nothing more than ordinary skill and routine experimentation. It is further noted that one of ordinary skill in the art at the time the invention was made would have readily appreciated that the use of epoxy resin as suggested by McKague et al. as modified by Hiyamizu et al. would have included using laminating conditions within the claimed ranges as it was well known in the art when using epoxy resins in fiber (e.g. graphite) reinforced composites used in for example the aerospace industry that the epoxy cures over a temperature range of 71-121 °C as shown for example by Kohli et al.

Regarding the hardening degree, McKague et al. teach the intermediate part is only partially cured, i.e. semi-hardened, to the extent that the shape of the part can be maintained in further processing operations, including additional curing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine/optimize the particular extent of the partial curing, i.e. hardening degree, taught by McKague et al. as modified by Hiyamizu et al. and Kohli et al. as a function of the type of additional processing

required to form the finished/final product as doing so would have required nothing more than ordinary skill and routine experimentation.

It is noted McKague et al. as modified by Hiyamizu et al. teach (step a) comprises heating under pressure by a hot press roll and cooling under pressure by a cooling plate. However, it would have been well within in the purview of one of ordinary skill in the art at the time the invention was made to use as the cooling under pressure means in the process taught by McKague et al. as modified by Hiyamizu et al. and Kohli et al. any well known and conventional cooling means in the art such as a cold press roll as cold press rolls were well a known cooling alternative in the art as shown for example by DellaVecchia et al. and only the expected results would be achieved, i.e. cooling the laminate.

Regarding claims 4 and 7, McKague et al. as modified by Hiyamizu et al. show forming a T-shaped intermediate product from a plurality of L-shaped board laminates wherein the flat board-shaped laminates in the product were formed continuously, i.e. from one flat-shaped board laminate cut into a plurality of boards (Figure 4).

Hiyamizu et al. are directed to a process for producing flat board-shaped composite laminates, e.g. used as preforms in the aerospace industry, from fiber-reinforced composite materials wherein the improvement is in forming the laminates by a continuous process rather than a batch process, the continuous process producing uniform quality laminates in an efficient (i.e. reduced time and handling involved) manner (Page 3, lines 1-3). Hiyamizu et al. teach fiber-reinforced prepreg/sheet materials comprising reinforcing fiber (carbon) impregnated with resin. Hiyamizu et al. teach the continuous (automatic) process for forming the composite laminates comprises: a) laminating a plurality of the prepreg materials to each other by

contacting with a plurality of hot press rolls (Rolls 16, 17, 19, 19a, 20, 20a, etc. of the Figure) followed by contacting with a cooling plate (29 of the Figure) to form a flat board-shaped composite laminate; and b) cutting the board-shaped laminate into a composite shape (38 of the Figure).

Kohli et al. disclose epoxy resins used in fiber (e.g. graphite) reinforced compositions used in for example aerospace composites wherein the epoxy preferably/beneficially cures at 71-121 °C (Column 1, lines 12-24 and 27-50 and Column 5, lines 39-48).

DellaVecchia et al. are directed to a stampable fiber reinforced thermoplastic sheet (Column 1, lines 5-9). DellaVecchia et al. teach a process for forming the stampable sheet comprising feeding layers of composite material (resin and fiber) to a laminating apparatus (Figure 1 and Column 2, lines 31-42), laminating the layers into a stampable sheet using heated press rolls (heating under pressure) followed by cooled press rolls (cooling under pressure) (Figure 1 and Column 3, lines 13-17 and 34-45), and cutting the laminated layers into stampable sheets (Figure 1 and Column 3, lines 43-45). DellaVecchia et al. further teach a stamping process comprising heating the stampable sheet followed by press forming the sheet (Figure 2 and Column 4, lines 37-45).

### ***Response to Arguments***

5. Applicant's arguments filed 3/12/04 have been fully considered but they are not persuasive.

Applicant argues, "In contrast, although McKague teaches that the McKague laminate is generally stored for cutting at room temperature in a low humidity storage environment due to

the hygroscopic nature of composite materials (column 6, lines 8-1 1), McKague fails to teach any conditions for cooling at 10-30°/0.1 to 10 kg/cm$^2$ as defined in step (a) of claim 1 herein." It is noted McKague teaches the composite materials are stored at room temperature such that there is a cooling step intrinsic to McKague. In any event, (step a) taught by McKague is a batch process and Hiyamizu is applied in combination with McKague to show forming composite materials of the type taught by McKague using a continuous process (preferable to a batch process) wherein the continuous process includes a cooling under pressure step prior to cutting the laminate into a storage stable composite material.

Applicant further argues, "Further, McKague is silent not only regarding the conditions necessary for laminating the stack by heating a plurality of sheets made of the fiber-reinforced composite at a temperature of 20-100°C/0.1 to 10 kg/cm$^2$ as defined in first step (a) of claim 1 herein, but is also silent regarding the necessary conditions defined in third step (c) such as heating at a temperature of 60-100°C/10-90 minutes for softening of the board, and cooling at a temperature of 0-50°C/0.1-10kg/cm$^2$ for proper processing and product characteristics (see page 5, line lines 4-11 and lines 15-28 of the specification)." The rejection above sets forth the reasons it would have been obvious to one of ordinary skill in the art to determine the laminating conditions particularly in view of Kohli et al. (newly cited) showing conventional epoxy curing temperature ranges for epoxy fiber reinforced composites used in the aerospace industry. Further, it is noted applicant has provided no unexpected benefit of using the claimed laminating conditions other than excessive fluidity of the resin above 100 °C, and it would be obvious to one of ordinary skill in the art that as the heating temperature increases the fluidity of the resin would also increase.

Applicant further argues, "Hiyamizu teaches a device for continuously producing fiber-reinforced composite materials by laminating and pressing a plurality of prepregs at 100-160°C by using a hot roller (English translation of column 2, lines 1-10, and right upper column 16, lines 12-16). This is quite different from the present invention in heating at 20-100°C in step (a), because when the heating temperature is more than 100°C, fluidity of the resin in the fiber-reinforced composite is excessively increased (see page 4, lines 25-27 of the specification). Hiyamizu further fails to teach or suggest a cooling temperature, though the cooling temperature in step (a) of the present invention is set at 10-30°C." As noted above Hiyamizu is used only to show forming composite materials of the type taught by McKague using a continuous process (preferable to a batch process) that includes heating and cooling under pressure steps. Hiyamizu, while not relied upon to teach the claimed laminating conditions, does not suggest the use of any particular resin and clearly teaches the use of any user adjusted laminating conditions (Page 6, lines 12-14) such that determining the laminating conditions in McKague as modified by Hiyamizu and Kohli et al. is obvious for the reasons given above.

Regarding applicants arguments to the DellaVecchia reference, it is noted DellaVecchia is applied solely to show a cold press roll for applying cooling pressure to a fiber reinforced laminate was known, a position not challenged in applicants arguments.

Applicant further argues, "In contrast, McKague does not specifically teach any composite part formed from a plurality of composite layers having a hardening degree of 1 to 80 %". McKague discloses a method of fabricating partially cured (i.e. semi-hardened) intermediate parts (preforms) from fiber-reinforced composites wherein a plurality of the partially cured parts may be assembled to from a composite part (Figure 4) **and then**

**(optionally) fully cured**. Thus, the assembly of partially cured parts is a composite part formed from a plurality of composite layers that are semi-hardened. As to the specific hardening degree of 1 to 80% or 1 to 50%, the rejection above sets forth the reasons it would have been obvious to one of ordinary skill in the art to determine the hardening degree.

### *Conclusion*

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is **(571) 272-1216**. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John L. Goff
April 6, 2004

SAMCHUAN YAO
PRIMARY EXAMINER